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ABSTRACT

The American Mathematical Association of Two-Year Colleges (AMATYC) is the voice of two-year college mathematics in the United States and Canada, and it has more than 40 affiliate organizations in the two countries. The organization is designed to promote professionalism among mathematics faculty at two-year colleges. This AMATYC publication describes the activities and characteristics of professionally active mathematics faculty members. The paper is divided into the following sections: (1) an introduction, which describes goals and background; (2) An Overview of Two-Year Colleges, including Mission, focus on teaching, and student profile; (3) Opportunities for Excellence in the Classroom, discussing professionalism in establishing a learning environment and professionalism in designing learning activities; (4) Opportunities for Excellence beyond the Classroom, which covers professionalism through independent enrichment, within the department, across campus, in the community, and in the mathematics education community; (5) Professionalism and Its Rewards, which explores contributions to student success and to community progress; and (6) an appendix, which includes personal reflections and information about the author. The publication also offers statements from Teaching Excellence Awards winners. (NB)

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OPPORTUNITIES FOR EXCELLENCE:

PROFESSIONALISM AND THE TWO-YEAR COLLEGE MATHEMATICS FACULTY

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OPPORTUNITIES FOR EXCELLENCE:

Professionalism and the Two-Year College Mathematics Faculty

AMERICAN MATHEMATICAL ASSOCIATION
OF TWO-YEAR COLLEGES

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PROFESSIONALISM AND THE TWO-YEAR COLLEGE
MATHEMATICS FACULTY

TABLE OF CONTENTS

INTRODUCTION 5
- ❖ Goals
- ❖ Background and acknowledgements

AN OVERVIEW OF TWO-YEAR COLLEGES 11
- ❖ Mission
- ❖ Focus on teaching
- ❖ Student profile

OPPORTUNITIES FOR EXCELLENCE IN THE CLASSROOM 19
- ❖ Professionalism in establishing a learning environment
  - ◆ Organization
  - ◆ High standards
  - ◆ Mutual respect
  - ◆ Caring
  - ◆ Enthusiasm
- ❖ Professionalism in designing learning activities
  - ◆ Pedagogical considerations and teaching styles
  - ◆ Student-centered learning
  - ◆ Contextual learning and problem-solving skills
  - ◆ Collaborative learning
  - ◆ Technology in the classroom
  - ◆ Mathematical communication
  - ◆ Tests and other assessment instruments
  - ◆ Additional classroom issues

Opportunities for Excellence beyond the Classroom 45
- ❖ Professionalism through independent enrichment
- ❖ Professionalism within the department
- ❖ Professionalism across campus
- ❖ Professionalism in the community
- ❖ Professionalism in the mathematics education community

Professionalism and Its Rewards 63
- ❖ Contributions to student success
- ❖ Contributions to community progress

Appendix 65
- ❖ Personal reflections
- ❖ About the author

Contributions from Teaching Excellence Award Winners
- Agnes Azzolino 49
- Don Bigwood 44
- Phil Cheifetz 27
- Phil DeMarois 10
- David Dudley 53
- Julie Guelich 18
- Robert Kimball 38
- Jean Lane 62
- Sharon Cutler Ross 58
- Lynn E. Trimpe 33
- Kathie Yoder 15

OPPORTUNITIES FOR EXCELLENCE:
Professionalism and the Two-Year College Mathematics Faculty

INTRODUCTION

❖ Goals

The American Mathematical Association of Two-Year Colleges, AMATYC, is the voice of two-year college mathematics in the United States and Canada, and it has more than forty affiliate organizations in the two countries. As the only international organization exclusively devoted to improving mathematics education in the first two years of college, AMATYC can be a major component of a two-year college professor's professional life. Strong, active affiliation with this dynamic organization provides an important avenue toward a rewarding career within our profession. Mathematics professors in community colleges and other two-year institutions find within AMATYC a wealth of opportunities for ongoing professional development throughout their careers.

Designed to promote professionalism among the mathematics faculty at two-year colleges, this AMATYC publication describes the activities and characteristics of professionally active mathematics faculty members. Professionalism has been described as the heart of an excellent professor. It threads through the entire fabric of an educator's life, formally and informally, in personal lives and in professional lives. Our professionalism and commitment can be as apparent in our casual conversations with friends and neighbors as it is in our professional interaction with students, colleagues, professional organizations, agencies, and policymakers. This book sheds light on the important responsibilities and opportunities inherent in our profession, and it strongly encourages the ongoing professional development of faculty. It is intended to be a resource book sharing support, encouragement, and insights.

There is considerable diversity among two-year college mathematics faculty and among the colleges in which they teach. There are professors at institutions with ample resources for professional development while others

teach at institutions where only modest funds are available. There are faculty who are members of large mathematics departments while others find themselves as one-person departments. There are full-time faculty and adjunct faculty. There are new colleagues who have recently joined the profession, and there are many experienced faculty members who have taught for many years. Because of this diversity, individual readers will determine which of the ideas expressed in this book are most appropriate for their particular situations.

This book also provides an introduction to mathematics education at two-year colleges for colleagues who are new to our profession, whether they are full-time or adjunct faculty members. Graduate students and others considering entering the profession will find informative insights into this potential career choice.

Teaching in a two-year college can provide an extraordinary opportunity for a rewarding and deeply satisfying career. As professors at these colleges, we have a profound impact on the lives of a richly diverse student population. We have an ongoing opportunity to help students pursue their personal goals of more meaningful work and more enriching and fulfilling lives. Two-year colleges are among the most exciting places to be in education today.

❖ Background and acknowledgements

In 1985, AMATYC published "The Two-Year College Teacher of Mathematics," written by a subcommittee of the AMATYC Education Committee. The focus of that publication—promoting professionalism and pride among two-year college mathematics faculty—remains relevant today. However, portions of the book have become dated. Through the AMATYC Consulting Professor Program, the author devoted a sabbatical leave to the writing of this new publication for AMATYC based on that earlier document.

A number of mathematics educators made significant contributions to this publication. First of all, sincere appreciation and recognition is extended to the AMATYC members who wrote the earlier publication –John Impagliazzo, Sharon Whitton Ayers, Peter Lindstrom, and Jean Burr Smith. Also, the recipients of the AMATYC Teaching Excellence Award were

invited to share insights in this document. Thanks to Agnes Azzolino, Don Bigwood, Phil Cheifetz, Phil DeMarois, David Dudley, Julie Guelich, Robert Kimball, Jean Lane, Sharon Cutler Ross, Lynn E. Trimpe, and Kathie Yoder whose ideas are shared on special pages throughout the document.

The educators listed below on the advisory review panel contributed in a variety of ways to this work. Some gave suggestions for the initial rewrite. Many AMATYC leaders provided feedback along the way as they reviewed various drafts of the document. Then a larger group of mathematics professionals gave input to refine the final draft. This document is stronger because of the valuable insights and contributions of these reviewers.

The author wishes to thank the following dedicated professionals, each of whom provided assistance at one or more stages during the writing process.

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Special appreciation is extended to Johnson County Community College in Overland Park, Kansas, for granting the author a sabbatical leave to write this document and for providing support and assistance during the project.

Additional thanks are due to the members of the AMATYC Executive Board, to Cheryl Cleaves, AMATYC Executive Assistant, and to the AMATYC Office Staff: Beverly Vance, Office Director; Christine Shott, Publications Director; and Christy Hunsucker, Accounting Director.

Carolyn F. Neptune

Phil DeMarois

Mt. Hood Community College
Oregon

The most rewarding aspect of teaching mathematics at the two-year college is the opportunity to help nontraditional college students reach their life goals. The two-year college system is unique in the accessibility to higher education that it provides for students who otherwise might not be able to pursue a college degree.

I am passionate about mathematics and I truly care about every student in the classroom. I make a special point in every class session to let students see my passion for the subject. I let students know that I care about their success and that I am willing to provide them every opportunity to succeed. Students are willing to work hard to succeed if they believe the instructor is behind them and will provide support for their success.

AMATYC gives me a voice in the national mathematics and education community that shapes the future of mathematics education in this country. AMATYC is a community of professional mathematics educators who care deeply about two-year colleges and the opportunity that these colleges provide. Being a member is invaluable when I have successes to share, problems to solve, or issues to advance. AMATYC provides a national forum to share ideas and problems in college mathematics education and, through the ensuing discussion, to continually improve the teaching of mathematics.

AN OVERVIEW OF TWO-YEAR COLLEGES

❖ Mission

When Joliet Junior College, the oldest public junior college in the United States, was established in 1901, no one could have anticipated the enormous impact of the community college movement on higher education. Joliet Junior College began as an experimental postsecondary program at the local high school. Other two-year colleges originated as extensions of trade or specialized schools. Many of these colleges were then absorbed within university structures and termed "junior colleges." Originally, the curriculum at two-year institutions consisted primarily of the freshman and sophomore level courses of the four-year colleges and universities. During the 1960's and 1970's, many two-year colleges were established in the United States. In the decades that followed, the number of two-year institutions grew and the unique role of these institutions evolved. Over time, many of these two-year colleges have expanded into true "community colleges." In addition to providing lower division courses, they offer vocational and technical programs and serve as lifelong learning centers to meet the specific needs of the local population. As such, these institutions have become vital forces for constructive change, not only in higher education, but also in community progress.

Some students enter two-year colleges to begin work toward the baccalaureate, and although some of these students earn two-year degrees before transferring to four-year institutions, others transfer without degrees. Many two-year college students have no plans to earn four-year degrees. For these students, the goal is often to complete an appropriate program of study leading to an A.A., A.S., or A.A.S. degree. Still others come to two-year colleges for technical and vocational certificates. Certificate programs vary in admissions requirements as well as in their focus and duration. The technical and vocational courses offered in certificate and degree programs make major contributions to a community's economic development. Some students see these programs as employment preparation while others view them as avenues to career advancement. Employed students often take courses to retrain themselves and to stay abreast of technological advances in the workplace. Finally, there is another large group of two-year college

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students who take courses simply for personal satisfaction. They pursue recreational studies, upgrade skills, or investigate personal interests.

Two-year colleges are avenues of access to higher education for millions of Americans. Community colleges comprise half of the higher education institutions in the United States, and a third of the higher education faculty teach at these two-year institutions. More than ten million students are enrolled in community colleges, and nearly half of the first-time collegiate freshmen in the country attend community colleges.[1] Two-year colleges offer educational opportunities to adults seeking to enhance their career possibilities, their economic status, or their personal satisfaction through academic enrichment. Therefore, throughout the mathematics programs at these colleges, we endeavor not only to prepare students for additional college-level mathematics coursework, but also to increase students' quantitative literacy—their ability to understand and to use mathematics in their careers and in other aspects of their lives.

Two-year colleges are known for their flexibility and for their responsiveness to community needs. Students appreciate these colleges for their accessibility, lower costs, open entry, convenient locations, and the practical nature of many of their courses. While providing an affordable quality education, each institution has a local orientation that reflects and embodies the essence of its community. These colleges adapt to different agendas determined by current community needs, and in this way, the colleges make direct contributions to educating local workforces. As two-year college students broaden themselves academically, they also enhance their communities. Because many two-year colleges tend to place more emphasis on results than on long-standing traditions, they can adapt quickly to contemporary problems and can make education relevant to the needs of the communities they serve. While sharing many of the values of our colleagues in other postsecondary institutions, community college faculty often lead the way in identifying future directions for reform in higher education. Community colleges are frequently recognized for their innovative vision and partnerships with local businesses and industries.

[1] Current demographic statistics about two-year colleges can be found at the American Association of Community Colleges website (www.aacc.nche.edu).

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❖Focus on teaching

Among institutions of higher education, community colleges are often characterized by their focus on teaching. Community colleges have been described as the most teaching-intensive component of American postsecondary education. While faculty at many four-year institutions concentrate on research in their disciplines, faculty at two-year institutions direct their efforts toward teaching and toward classroom research.

Of course, community college faculty do have responsibilities outside their teaching assignments. These include such activities as curriculum development, college committee work, advising students—either formally or informally, continuing education, and community service. Some faculty have administrative duties along with their classroom responsibilities. Nevertheless, for faculty at community colleges, teaching can be the primary focus. Most community colleges have small class sizes allowing for more personal attention for each student. The small class size gives students greater opportunities for contact and interaction with faculty both inside and outside the classroom. Most faculty at two-year colleges spend approximately fifteen hours per week in the classroom while faculty at four-year institutions usually spend ten hours or less per week in the classroom. Many community college class sections are devoted to developmental courses, but the entire curriculum includes the same courses that comprise freshman and sophomore offerings at four-year institutions.

For mathematics education professionals who truly enjoy teaching, two-year colleges provide unique career opportunities. More than half of the full-time faculty at community colleges may retire within this decade. Facing the potential turnover of a significant portion of the experienced faculty, community colleges will have an unusually large number of faculty positions to fill.

Just as teaching at the community college differs from teaching at a four-year institution, it also differs significantly from teaching in a secondary school. Collegiate pedagogy assumes that the majority of the students are adults. Academic concerns are addressed directly with the students rather than with parents or other family members. As adults, college students are expected to take responsibility for their own attendance and classroom

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behavior. Some young students are in community college classrooms through programs giving secondary school students the opportunity to enroll concurrently in college classes. Nevertheless, discipline problems arise less often in community college classrooms than in secondary schools because college students who do not want to be in the classroom usually withdraw from classes or simply stop attending. The students who remain have chosen to be there.

Today's two-year colleges play an increasingly vital role educating our country's future teachers and scientists. Many of our future teachers take their only mathematics courses at community colleges. As community colleges continue to provide critical mathematics courses for our country's future teachers, it's imperative for those of us teaching these classes to model sound educational practices that we would want these students to adapt to their own classrooms in the future.

Kathie Yoder

Los Angeles Pierce College
California

I have taught mathematics at the high school and university levels. However, when I transferred to the community college level, I knew I had found my niche...I had rediscovered that emotional connection and communication with students that goes beyond the usual classroom rapport.

The key to my success is that I expect all of my students to succeed. Although I know they are juggling a lot of responsibilities, I consider it unacceptable for them to drop the one representing their math homework. I sympathize that their problems make fulfilling their responsibilities difficult, but they still have to fulfill them. I have great respect for these students and the odds so many of them must overcome to succeed, and their success gives me almost as much satisfaction as it does them.

I am indebted to AMATYC. The organization provides conferences and workshops that keep me current on new developments in math education and that renew my enthusiasm to try out all the great ideas which other educators have found successful. AMATYC also gives me the opportunity to meet and work with many dedicated mathematics educators. Their extraordinary contributions inspire me to increase my own efforts on behalf of our students.

❖ Student profile

The students at two-year colleges are as varied as the institutions themselves. Teaching at these colleges allows a professor to interact with what is perhaps the most diverse and interesting cross-section of students in higher education. Many two-year colleges have a student body that reflects a rich, vibrant diversity of ethnic and cultural backgrounds. There is also great variety in the economic status, experiences, and goals of these students. More than half of the students come from families with no tradition of higher education, so many students lack family role models or support systems to assist in the transition to college life. Many students are first- or second-generation Americans. At two-year colleges, more than half of the students are part-time students. Many students balance the responsibilities of family and work along with the demands of their academic careers. Far more than mere distractions, these family and work responsibilities place demands on their time that can be neither postponed nor ignored. The majority of community college students lead complex lives that require them to juggle and prioritize a variety of obligations in addition to their coursework.

Community college students are typically older than their counterparts at four-year institutions. This additional maturity of the students contributes to the diversity in their backgrounds and experiences. According to the American Association of Community Colleges, the average age of community college students across the country is 29 years.[2] Although some students enroll in community colleges immediately after high school, a great many others are nontraditional students who have been away from school for several years. These nontraditional students frequently harbor concerns about their academic talents.

The open admissions policies at most two-year colleges invite widely diverse groups of students to pursue academic opportunities. There are at-risk students who have deficient academic backgrounds and are considered underprepared or underskilled for college-level courses. Another group of

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[2] Current demographic statistics about two-year colleges can be found at the American Association of Community Colleges website (www.aacc.nche.edu).

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students need English as a Second Language (ESL) courses. These students must add the challenge of developing language facility and fluency to the normal academic demands. Still other students exhibit behavioral and attitudinal characteristics of what is called the "sound-bite" generation or the "instant gratification" generation. In addition, many students have poor study habits and have not yet developed requisite study skills. As in any academic institution, there are students who are faced with learning disabilities and others with physical disabilities. Indeed, some two-year college students have overcome great adversity just to enter college.

Many students who enroll in two-year colleges have weak mathematical backgrounds. They lack basic arithmetic and algebraic skills necessary for college level mathematics. As a result, most of these students also lack confidence in their ability to succeed in mathematics, and they enter mathematics courses with great anxiety. This anxiety seems much more prevalent in mathematics than in other academic disciplines. Too often these students are reluctant to ask for help. In addition, they frequently feel frustrated when they realize that they need to complete several mathematics courses to prepare themselves for future coursework or for their intended careers.

Although many students face serious challenges in adapting to the demands of college coursework, two-year colleges enroll a great many students who are exceptionally hard-working individuals with a strong desire to learn. The decision to enroll in college frequently requires a lifestyle change for students whose lives have been centered previously on their families or on their work. These students enroll for specific purposes. As a result, the majority of these nontraditional students possess a high level of motivation, a strong work ethic, and a great determination to succeed. Along with their maturity, they bring their richly diverse prior experiences to the classroom. Community college faculty value the unique strengths these adult students contribute to classroom activities.

Julie Guelich

Normandale Community College
Minnesota

The most rewarding part of teaching at a community college is working with students from many different backgrounds. I have almost a missionary zeal about my career. Many of my students have not been successful in mathematics in their previous educational experiences. What I love to try to do is to show them the beauty and importance of math. I try to help them find some way to succeed. What is so amazing is that many students who thought that they had no aptitude for mathematics find that they are actually quite good at it and even enjoy it. Students who begin in developmental math and then go on to become engineers or math teachers are so impressive!

I spend a great deal of time preparing for my classes. I like to include activities, computer labs, and group experiences whenever possible. I plan out my courses in quite a bit of detail at the beginning of a semester, but I try to retain flexibility so that if I need to take more time on a difficult topic I can still stay on track. I try to follow the "golden rule" in my classes: teach mathematics to my students the way I would like to have it taught to me. Finally, I have come to believe that the best way to teach students is to mentor them.

OPPORTUNITIES FOR EXCELLENCE IN THE CLASSROOM

❖ Professionalism in establishing a learning environment

Teaching is the focus for two-year college mathematics faculty. Teaching is the essence of what we do. Regardless of whether we teach in traditional classrooms or virtual classrooms, we work hard to improve the quality of the learning that takes place there. As faculty, we have the responsibility and the opportunity to establish an appropriate environment for learning, to create the conditions that allow and encourage the most learning to take place. Supportive learning environments can be characterized by

- organization,
- high standards,
- mutual respect,
- caring, and
- enthusiasm.

◆ *Organization*

Preparation is the key to organization. The structure and organization behind an entire course, as well as the structure and organization in daily class sessions, need to be apparent to students. This requires a conscious effort. Our individual organizational styles reflect our attitudes toward our classes and our personalities. An organized approach provides focus and coherence for students. Organization also contributes toward their increased confidence. Students want and deserve the assurance that their professors know where they are going and how they will get there. Organization does not preclude flexibility; instead, it provides a basic framework for each class session from which we can respond with freedom and spontaneity to learning opportunities that arise in the classroom.

Content mastery is an essential, inherent part of organized teaching. The assurance that accompanies this proficiency allows us to respond more readily to unexpected classroom questions or situations. Without such a grasp of course content, we have to concentrate too much on the "what" of our teaching, and, as a result, the "who" and the "how" are neglected in the

process. We want to be so comfortable with the course content that our attention can remain on our students and our pedagogy.

Time management is another element of organization, and it is an important consideration as we plan a course and write a syllabus. Setting an appropriate pace for the entire course as well as for individual class sessions is essential. Many of us could help our students by reminding ourselves to slow down and not race through material. Dismissing classes on time reflects not only our organization but also a respect for students and their commitments. Sometimes a hurried pace or late dismissal can be attributed to a lack of effective time management early in the class period. It takes practice and effort to make the most efficient use of the valuable minutes allotted for each class session.

Being clear and specific in our expectations for students is another essential aspect of organization. Syllabi and assignments are opportunities to demonstrate clarity. We want to give detailed instructions and guidelines that clarify our expectations; then when we evaluate student work, we need to follow those established guidelines. It is important to have a policy regarding late work and to apply that policy fairly and consistently. Clarity is also essential in the smallest details, such as writing legibly and being sure students can hear us clearly.

We demonstrate one of the most important aspects of educational organization when we consistently put new ideas in context. When students see how new ideas fit with previously learned concepts, understanding increases and more learning occurs. It takes only a few moments of class time to review the goals of the previous class and preview new content. These simple steps help students see connections and the flow of content from one topic to the next. We also want to be sure students recognize what is most important in a class session. Making a conscious, consistent effort to do so requires us to heighten our awareness of the most critical concepts for each course and each class. We can help make important information stand out by directly stating the importance of a concept, by repeating major points for emphasis, or by simply taking occasional moments to pause in order to provide students more opportunity for contemplation and analysis. Briefly summarizing at the end of class focuses attention on the major ideas as we

bring closure to the class session. Our organizational skills, along with a willingness to help students synthesize and summarize, greatly aid students in seeing more structure and connectivity in mathematics.

◆***High standards***

Inherent in good teaching is the establishment of high standards. As we expect and demand quality student performance, students usually respond and rise to meet our expectations of excellence. We set high performance goals for all students, regardless of race, gender, socioeconomic class or disability. We help students understand why the high goals are necessary and then guide them toward accomplishing those goals. Ideally, our expectations are challenging but not overwhelming. We want to set ambitious goals for ourselves and for students, but we also want to make those expectations reasonable and attainable.

Setting high standards includes the expectation that students are working on mathematics outside the classroom as well as in class. Most learning takes place as students wrestle with new concepts and practice skills to make the new ideas their own, and much of this learning has to take place outside the classroom. This makes a strong case for the need for homework on a regular basis. Time on task positively impacts learning. The quantity and quality of study time is a major determinant of student success, and we want students to be aware of this relationship. Homework should be of an appropriate length and rigor. Grading at least some portion of the homework regularly not only greatly increases the likelihood that students will complete assignments but also gives insight into how the class is progressing. The development of a coherent, connected, rigorous series of assignments can greatly promote learning.

In recent years, changes have taken place in the teaching of mathematics, but none of the changes decreases the need for rigor and depth. Mathematical abstraction and basic skill acquisition remain important. It's appropriate to expect commitment from students. Students need to realize that academic success requires real effort. They need to develop qualities of persistence and tenacity. We want students to acquire a sense of personal responsibility for their learning, increasing their self-confidence and self-esteem in the

process. When we set high standards that reflect the strength of our academic integrity, we encourage students to exercise their innate desire to excel.

◆***Mutual respect***

Mutual respect is the foundation for the constructive classroom rapport in which faculty and students communicate ideas in an atmosphere of obvious congeniality. The fair, ethical, and equal treatment of all students demonstrates respect. We build a foundation for trust when we base our direct, forthright communication with students, both in and out of the classroom, on sincerity and respect.

We can demonstrate respect for students in simple ways, such as promptly returning graded work, whether it is homework, projects, or tests. Feedback is more valuable the sooner students receive it. We also show respect and let students know we value their opinions by regularly obtaining input from them about their progress or their concerns. Each effort we make to indicate respect for the individuals in our classroom encourages students to mirror that respect in their communication and interaction with one another and with us. Constructive classroom interaction is based on mutual respect.

Nowhere is a professor's respect for students more evident than in the handling of students' questions. When students feel a supportive classroom environment, they know their questions are not only welcomed, but also encouraged. It is important to create an atmosphere that students perceive to be safe for questions, otherwise, they will not participate openly in classroom discussions. Our willingness to answer the same question a second time—or even a third or fourth time—requires patience, but it also indicates respect. On occasion, time constraints in the classroom demand that a question be postponed, but this can be done tactfully. Perhaps the question can then be dealt with outside of class. Students deserve the assurance that their questions are important and will be answered professionally.

Students often find it difficult to formulate and verbalize mathematical questions, and so many students are reluctant to ask questions in a mathematics classroom. We can help overcome that reluctance by first encouraging questions and then being willing to rephrase or set a question in

context. We can transform a poor question into a good one by turning it into a constructive part of the discussion. This requires practice, but it is worth it, and it demonstrates our responsiveness to students' concerns.

Any question can provide a learning opportunity, not only for the questioner, but also for everyone else in the room. Similarly, a demeaning or impatient response to a question is felt and remembered by everyone in the room. An arrogant, uncaring, or demeaning response to a student's question is inappropriate. Even when we must give a negative or critical response to a student, it can be done with respect. All of us have been students, and as students, too many of us have watched as a classmate suffered the pain of an instructor's put-down. As we recognize, understand, and appreciate the diversity of our students' cultural perspectives, ethnic backgrounds, and experiences, we respect their points of view. Students feel and respond to that respect. Our students deserve no less.

- ***Caring***

Nurturing is a part of good teaching. For many students, the study of mathematics seems intimidating and forbidding. Perhaps no other subject frightens so many. We want to empower our students. We want to help them remove the barriers that they feel mathematics puts between them and their dreams. Demonstrating care and compassion doesn't mean lowering standards nor does it mean stepping away from a highly professional relationship with our students. Instead, demonstrating care involves raising our awareness of our nurturing skills.

As caring faculty, we are sensitive to students' needs and values. We listen to their frustrations, fears, and concerns. We are aware of their strengths and talents. We reach out to those with learning difficulties or disabilities and to groups who are underrepresented in the study of mathematics. Caring means we appreciate and respect the uniqueness of each student in our classrooms. Caring means we're willing to focus more on the people we're teaching than on the content. Caring means we listen. Caring means we let students know we admire their determination and share their personal triumphs as well as their disappointments. These aspects of caring help to establish a supportive learning environment.

All people share a basic human need to know that others care about them and respect their needs. Students want to feel a connection with their professors. We want to let students know that we see and appreciate them as individuals with unique talents and experiences. Our caring brings special warmth to our classrooms, and for some students, that warmth is an essential ingredient for learning. Many professors devote some time on the first day of class to getting to know students. Others arrange an appointment with each student during the first few weeks of class. As we take interest in students and actively express that interest, students respond.

Wanting our classrooms to have a non-threatening, risk-free atmosphere for learning, we make conscious efforts to establish this environment. Creating the atmosphere of a classroom community is a worthwhile endeavor. It's advantageous for students to feel they are part of a learning community. Obviously, teaching is not a confrontational activity since faculty and students are working toward the common goal of increased mathematical understanding. Communication is the key. A conversational tone is helpful in dialogues with students. Informal conversation prior to class can also be beneficial. Occasionally we're required to be experts in human relations as we handle difficult personal relationships within the classroom. Nevertheless, we contribute to student learning when we endeavor to build a community atmosphere based on caring, encouragement and respect for one another's opinions.

A community feeling helps students see value in helping one another and working together. When we focus on classroom sharing, students are less apt to view one another as competitors. We want to prevent any one student from dominating classroom discussions or from repeatedly sidetracking the class with tangential issues, and we look for opportunities to involve every student in classroom activities. Creating a community feeling has long been recommended for our international students, but in reality, all students benefit from a community atmosphere where everyone can enjoy a sense of belonging, a support system, and opportunities for social bonding.

Another basic way to demonstrate that we care about our students is by being available to them outside of class. Keeping office hours at a variety of

convenient times, and encouraging students to come in during office hours are first steps. As we increase our accessibility, we expand our opportunities to become better acquainted with our students, and this can be a valuable component of teaching. Students need to be reminded to seek help as soon as possible instead of waiting until they have fallen far behind the rest of the class. When we comment in class about a question that an unnamed student asked during office hours, we subtly endorse students' use of our office hours, and this action often encourages other students to come in for assistance.

We can increase our accessibility through the use of technology. Many faculty members invite students to communicate with them via email. As we use this avenue for communication, it's vital to check our email regularly and respond to it promptly. The prompt reply is meaningful even when we must tell a student that we have received the email and will respond in detail later. Sharing information with students online is another avenue for communication. When we post information online for students, we need to be certain that the material remains current and readily accessible.

Encouragement can be a natural outcome of our caring approach to teaching. Large daily doses of encouragement go a long way to combat the frustrations of many students. Because of previous failures and frustrations, some students believe they cannot acquire mathematical skills, regardless of the amount of effort they put forth. Too many students think mathematical understanding is an innate trait that they lack. Our encouragement can help such students replace that limiting outlook with the assurance that mathematical proficiency can be developed through persistent effort. Encouragement can be a reminder of the necessity for students to practice and study on their own, to put forth extra effort when needed, and to persevere when facing challenges. We want students to realize that an education is something to be earned. Our urging and prodding can help motivate students when their own inner motivation wanes or seems insufficient. As we encourage students, we often help them confront and overcome their fears. Our encouragement and optimism help them realize that they can achieve success. Perhaps most importantly, our encouragement shows students that we care.

◆ ***Enthusiasm***

A final component of a supportive learning environment is the contagious enthusiasm we bring into the classroom. Enthusiasm is the attribute most consistently mentioned when students describe excellent professors. We want to help build a sense of wonder and excitement in the learning process. We want our love for teaching to be obvious. As students respond to our energetic enthusiasm, the enthusiasm becomes contagious, helping students feel excited about the learning that is taking place in the classroom.

We want to be aware of both the verbal and nonverbal messages we give students. Students respond not only to our words, but also to our attitude, our behavior, and our body language more than we realize. Students feel our enthusiasm as they see our patience and persistence. It's important to show students how much we enjoy what we're doing, and a two-year college professor who doesn't enjoy teaching should find a more appropriate career. We've all seen dynamic faculty who display their thirst for learning as well as their zest for teaching. Their inner energy and spirit bring their classes alive. Students should be able to sense our commitment and our passion for our chosen profession.

We also want students to see our enthusiasm for mathematics. Our efforts to make mathematics interesting, exciting, and stimulating can increase students' curiosity and desire to learn. We want to encourage students to continue the study of mathematics. Our own love of mathematics and our intellectual vigor can help motivate students toward an appreciation of the beauty and the power of this discipline. A shared enthusiasm for learning is the foundation for a supportive classroom environment, for a learning community that allows students to reach their potential.

Phil Cheifetz

Nassau Community College
New York

The key to success in the classroom is enthusiasm...it is contagious. Also, one must connect mathematics to other disciplines: history, economics, biology, psychology, physics, etc. When students make links with their own fields of interest, we in mathematics get a value added response: students realize how and why the mathematics topics they are learning should be important to them.

❖Professionalism in designing learning activities

Across the country, classroom by classroom and day by day, the teaching of two-year college mathematics continues to evolve. There are important reasons behind the ongoing changes. Curricular reform efforts, research into how students learn, and technological advances impact classroom activities. Basic tenets of instructional design and delivery for many courses can be found in the AMATYC publication *Crossroads in Mathematics: Standards for Introductory College Mathematics Before Calculus*.[3]

❖*Pedagogical considerations and teaching styles*

Recognizing that pedagogical improvement is an evolutionary process, we want to spend at least as much time considering *how* we teach as we spend thinking about *what* we teach. Good teaching cannot be circumscribed by a single method. Effective teaching cannot be limited to a set of specific strategies. It takes time, energy, and effort to be an effective professor. Knowing mathematics is just the beginning. Our passion for teaching and our commitment to students cause us to carefully consider pedagogical choices and to bring our finest professional expertise, abilities, and attitudes into the classroom each day.

A few students of mathematics are so talented and dedicated that they could learn most required mathematical content by themselves. These gifted students could be successful regardless of the skills or pedagogical choices of their professors. However, for the vast majority of students, professors and their teaching styles have a significant influence on student success.

Successful professors develop teaching styles that are uniquely individual. As faculty, we need to be true to ourselves in the classroom. Our teaching styles inevitably mirror our personalities. By periodically reflecting on what we're doing in the classroom, we incorporate a repertoire of instructional techniques that we find most effective. We decide what works best in a particular classroom at a particular time. Most of us continue to revise our

[3] Information about AMATYC publications is available at the AMATYC website (www.amatyc.org).

classroom strategies. We modify, polish, and refine our teaching styles. We experiment with new techniques. The strategies that feel right to us become more instinctive and, as a result, more effective. Underlying each new approach is a continuing respect for students and for their learning. The goal of increased student learning is the basis from which we evaluate pedagogical methods.

Research indicates that students learn in different ways so we make conscientious efforts to incorporate various teaching methods in our classrooms. As we become more knowledgeable about learning styles and multicultural perspectives, we develop sound instructional strategies for different situations. When we consider several ways to present a topic, we are prepared to change methods when a particular approach is not effective. This willingness to modify our techniques demonstrates our flexibility. Using a variety of interactive teaching strategies allows us to address the different learning styles and needs of our diverse student population and to reach as many students as possible.

Learning is more efficient when new information is structured and related to what students already know. Helping students find structure, order, and priority in new ideas is fundamental to good teaching. Teaching a structured subject such as mathematics compels us to adopt an organized approach that includes making connections, finding relationships, and noticing patterns. We repeatedly look for opportunities to put new concepts in the context of a bigger picture.

As we connect and integrate topics, students can see more easily how mathematical principles are interrelated. Mathematics has been described as a study of patterns. We want to help students develop the ability to recognize patterns and make connections. The use of numerical, symbolic, graphical, and verbal approaches to new concepts helps students see critical relationships. We want students to realize that there is no single right method for solving a mathematics problem. The use of multiple approaches also helps students gain valuable flexibility in the ways they approach mathematical problems.

Research continues to indicate the direct relationship between increased time on task and increased academic success. We design lessons so that new topics are introduced, then investigated and explored, and finally practiced and reviewed over a period of time through relevant assignments and activities. By making appropriate choices of activities for the classroom and appropriate assignments for outside of class, we encourage more time on task for our students, thereby increasing their likelihood of success.

Engaging in scholarly classroom research is an excellent way to determine how pedagogical choices affect student learning. The results of our classroom research can have a positive impact on our teaching. Every research attempt is an opportunity for learning. Indeed, every attempt to try a new approach in the classroom is a learning experience and can be the basis for classroom research. Even when a strategy is unsuccessful, we learn something by trying. Some educators thoughtfully approach each class as an experiment in learning and an investigation of how students learn. It's helpful to discuss our results and insights with colleagues. Most importantly, we can use the results of classroom research and analysis to make instructional decisions for future classes.

Many professionals find it beneficial to keep teaching journals in which they regularly jot down thoughts about their teaching. These journals include comments about pedagogy as well as content. Allowing ourselves time for reflection after class, we can note possibilities for improvement, and we can record the strengths and weaknesses of certain classroom methods or activities. Such a journal can also be used to track professional activities and professional growth as well as to set goals for ourselves and for our classes.

We all can ask ourselves whether we are being innovative in our teaching. We need to teach in a way that is comfortable, but we also want to be receptive to new approaches. As we bring a spirit of innovation to our work, we are willing to take risks and try new strategies. The continual refinement of teaching methods warrants this degree of risk-taking and revitalizes our teaching.

◆***Student-centered learning***

If no learning occurs in a classroom, then it is clear that no real teaching has taken place. As we develop, deliver, and judge our teaching methods, our focus remains on student learning. We evaluate each aspect of our teaching in terms of the learning that it engenders.

Rather than always taking the role of the expert in the classroom, we may often want to assume the role of classroom coach. In this capacity, we give necessary guidance and specific instructions, but a coaching perspective focuses on making suggestions and offering encouragement and support. The coach guides students by asking questions. Carefully constructed questions can lead classroom discussion until students connect previously understood concepts to new ideas. As coaches, we help students investigate different alternatives, test various approaches, and discuss the results. Summarizing at appropriate intervals and helping students make comparisons and connections are other useful coaching techniques.

As students take an active role in their education, they become more independent learners. We want students to be participants in the classroom rather than spectators. Indeed, we want students to be at least as active in the classroom as we are. It is the students who ultimately connect new concepts with their existing knowledge. Student engagement in learning activities is frequently characterized by lively conversations and active participation. At other times student engagement might be quiet, thoughtful experimentation with a new concept. As students are involved and intellectually engaged, learning is internalized, and student-constructed knowledge is more likely to be transferable to other situations.

Improvements in pedagogy can result from our alertness to student suggestions, whether explicit or implicit. Being responsive to student evaluations is one place to start. Of course, an individual student evaluation may be inappropriate or unjustified, but studies indicate that the aggregate evaluations accurately measure instructional skills and organization as well as rapport and respect. Students easily recognize whether professors are enjoying what they do and whether they are comfortable and secure in their approach to their work. It requires receptivity to accept criticism about our

teaching and to use that criticism as a springboard for improvement. Beyond formal student evaluation tools, we can use implicit student suggestions in the classroom. When we sense those moments when students are not grasping a concept, we trust our intuition and respond by taking a different approach to the topic. We also can ask students for specific feedback about the topics they understand and the topics that remain confusing. We might ask students to describe how they have mastered the topics with which they feel comfortable. Knowing which approaches and activities are most helpful to students aids us in making appropriate pedagogical decisions.

Students and professors working actively together create some of the best learning experiences. The importance of engaging students in the learning process is related to the issue of respect. We can take steps to overcome the stereotypical view that the professor is the sole authority in the classroom. As we reduce students' dependence on us, we empower students.

Lynn E. Trimpe

Linn-Benton Community College
Oregon

It was finals week. I was up to my ears in exams and projects to be graded. A student appeared at the office door and wanted a word with me. Not one of the vocal students in class, not an "A" student in the class, he was like hundreds of students we all have in class every year, so his comment was rather unexpected. He said, "I think sometimes you don't realize what a big difference you make in students' lives, and I just thought I ought to tell you."

It's true that we don't often hear from students whose lives we have impacted, but many students really are changed by their experiences in our classes. Math anxious students blossom and develop the confidence to think mathematically. Confident and motivated students acquire the skills to accomplish whatever they came to college to do. Some undecided students may even decide to become mathematics teachers as a result of their experiences! As educators, we frequently do leave an imprint on our students' lives. That possibility presents us with an exciting opportunity as well as a serious responsibility, and, for me, it's the most rewarding thing about teaching at the community college.

◆***Contextual learning and problem-solving skills***

Introducing a mathematical concept in the context of solving a relevant problem can provide students with a reason as well as a context for learning the new concept. Problem solving is a primary focus of mathematics instruction. An application-driven curriculum allows students to investigate real-world mathematics and develop valuable modeling skills. As the focus moves from isolated skills to broader conceptual understanding, students can transfer their knowledge to new situations and can appreciate mathematics as a dynamic discipline.

If students are to adapt their learning to new situations, they need critical thinking and reasoning skills. We want students to be inquisitive and persistent in addressing problems. In addition, we want them to be able to analyze situations from a quantitative basis, to identify and synthesize pertinent numerical information, to be aware of relevant chronological and spatial relationships, and to consider the reasonableness of potential answers. These skills prepare students to become problem-solvers, not only for themselves but also for society.

Applications must be chosen carefully, and finding appropriate applications can be challenging. A solid application question often requires students to comprehend the relevant information given in the problem, formulate a mathematical model that represents the situation, solve the mathematical problem, use this solution to obtain answers to the original question, check the reasonableness of those answers in the context of the application, and draw appropriate conclusions. Applications connect mathematics to other subject areas and show the relevance and utility of mathematical concepts. Appropriate applications lead toward, rather than distract from, the relevant mathematics to be learned.

More extensive application problems can become student projects or laboratory experiments. It is beneficial for students to work on a project, either alone or with a group of students, over an extended period of time. We want students to investigate rich and meaningful situations requiring nontrivial work. When assignments require students to make a sustained effort to explore problems without unique answers, students increase their persistence and tenacity along with their self-confidence.

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We want students to have opportunities to be creative problem-solvers at all levels of mathematical understanding. As we discuss problem solving in the classroom, we can emphasize the desirability of testing a variety of approaches to solving problems. Many professors introduce students to the problem-solving strategies described in George Polya's book *How to Solve It*. Praising new insights and alternative approaches assures students that there are many ways to solve problems. We want to encourage mathematical curiosity, and with practice, we can carefully link students' creative conceptualizations with more conventional representations.

As students are learning specific mathematical skills, we want them to understand the connection between those skills and the use of the skills in problem solving. Fully understanding a mathematical concept includes an appreciation of both when and why a particular skill would be appropriately applied in a problem-solving situation. With this understanding, students begin to use mathematics more flexibly and to apply familiar skills to situations not previously encountered. Through the repeated transfer of prior learning to new situations, students develop mathematical intuition and mathematical insight. With these strengths, students are equipped to continue to educate themselves mathematically throughout their lives.

◆***Collaborative learning***

Students benefit from learning to work on mathematical activities with others. Cooperative learning experiences can strengthen and improve students' abilities to communicate mathematically and to solve problems. Through these activities, students realize that people think about mathematics in a variety of ways. Differing strengths of individual students can be highlighted within a group environment.

Group experiences help prepare students for similar problem-solving experiences in the workplace where teamwork is vitally important. Collaborative learning allows students to practice skills of communication, cooperation, flexibility, and receptivity as they thoughtfully consider the ideas and approaches of their fellow students. In addition, students have the opportunity to become better consensus-builders by respectfully discussing differing opinions, persuasively articulating their own viewpoints, and

working together toward common goals. Collaborative activities also give students opportunities to explain topics to one another, and these brief teaching experiences can positively impact the depth of students' understanding.

Collaborative activities help replace the potential for intellectual or social isolation with a more communal classroom environment. Students are less likely to give up when they are involved in a group effort. Groups are also more likely to try various approaches to a problem. In this process students hear multiple perspectives on solving problems. Cooperative learning can combat feelings of low self-esteem. Working with others also tends to help students stay on task because they feel a shared sense of responsibility to complete the assigned work. When students work together toward common goals, the classroom environment becomes less competitive, students help to motivate one another, and a healthy camaraderie often develops within the classroom.

Collaborative opportunities often lead to the formation of study groups that continue throughout a course. Study groups become small communities of learners who work together to accomplish common goals and build a level of comfort and trust in the group process. Sometimes collaborative activities provide the beginning of a support network that students maintain throughout their academic careers.

- ***Technology in the classroom***

Technology is used to enhance and enrich mathematics instruction. The routine use of appropriate technology in the mathematics classroom prepares students to use their mathematics in the increasingly technological world economy. Technology has earned a place in both the classroom and the workplace by providing powerful tools for demonstration, communication, computation, simulation, prediction, and research. Faculty recognize their two-fold responsibility, first to select appropriate technology and then to use it effectively in the classroom. Our careful decisions regarding technology usage allow students to recognize the limitations of technology while they learn to appreciate its power.

The responsible use of technology can help students develop mathematical insights and enhance students' understanding of mathematical concepts. Whether we are using basic calculators or sophisticated mathematical software, technology can encourage a student's active curiosity and exploration of mathematical relationships. By allowing students to examine many examples in a brief period of time, technology makes it easier for students to experience mathematical inquiry, investigation, and discovery. Students also develop confidence in their ability to use technology effectively.

When technology is used in our classrooms, the goal is not to teach students the use of the tool itself; the goal remains to teach students mathematics and to provide opportunities for students to apply and strengthen their critical thinking skills. For example, as graphing technology is used, students need to understand the underlying relationships that connect a function with a table of function values and with the corresponding points on its graph. Students need to understand *why* particular types of graphs share certain characteristics. Because technology removes some of the drudgery of mathematical manipulation, computation and graphing, students are able to explore areas that they might never have considered without the relevant technology. Obviously, we expect students to demonstrate certain skills without the help of technology. An appropriate balance is required at all levels of mathematical coursework. The key is to teach students to use every mathematical technique with understanding, whether that technique involves the use of technology or the use of an algorithm.

One of the most dramatic advances that technology has brought to education is the Internet. The Internet provides faculty access to powerful and growing resources for enhancing mathematics instruction. Incorporating the mathematical resources of the World Wide Web into classroom activities and assignments can broaden the scope of students' explorations. Students and faculty have access to a wealth of data and information that heightens the relevance and timeliness of applications. Internet connectivity not only contributes to instruction in traditional classrooms, but it also provides the basis for virtual classrooms and a variety of synchronous and asynchronous distance-learning opportunities.

Robert Kimball

Wake Technical College
North Carolina

Before I began attending AMATYC conferences, I think I was a relatively good lecturer. I could plan and deliver a lesson, complete with good questions and detailed examples, so students could do their homework nightly. Each time I taught something, I would learn a little more about what questions to ask and what examples to give. However, fifteen years later and due in no small way to my involvement in AMATYC, I think I am a much better math teacher.

Now, I don't concentrate on what to tell students, but on what I want students to learn and to be able to do. Teaching is now much more demanding, and a great deal more rewarding. AMATYC provided the opportunity and the motivation for me to assess my performance, not against how I taught last time, but against how other professionals were managing their classroom. Attending sessions and discussing techniques with colleagues gave me the encouragement to make changes that positively affect the learning environment.

• ***Mathematical communication***

In mathematics classrooms, activities that encourage oral and written expression help students improve their mathematical communication skills. We want to provide opportunities for students to read about mathematics, write about mathematics, speak about mathematics, and listen to mathematical communication.

All mathematical communication requires the use of a mathematical vocabulary. Too many students report that they use mathematics textbooks, or online textbook alternatives, only for finding homework exercises. We can encourage students to read about mathematics, not only in their textbooks, but also in a variety of print and online resources. We can ask students to compare and evaluate information they have obtained from various sources. Reading about mathematics helps students widen their mathematical vocabularies, and improved vocabularies can improve students' ability to write about mathematics.

In order to read or write effectively about mathematics, the symbolism of mathematics must be understood along with the vocabulary. We want students to develop an appreciation for both the efficiency and the eloquence of mathematical symbolism. When students understand the symbolism of mathematics well enough to write with it, they can interpret it correctly when they read it.

There are many types of writing assignments. Writing mathematical autobiographies and keeping mathematical diaries allow students to express their feelings about mathematics. Students can write individual or group reports that describe the results of mathematical investigations or summarize the major points of a topic in mathematics. Some extensive writing assignments covering broad topics or lengthy investigations might require several weeks of work. Other brief writing assignments might be accomplished during a few minutes of a class period.

In addition to assignments that require reading or writing about mathematics, we can design opportunities for ongoing classroom dialogue that focuses on mathematical ideas. Asking either individuals or groups of students to explain their thinking about specific topics or situations can be helpful.

When students do group work, they are necessarily involved in oral communication about mathematics, and in this way, collaborative activities can enhance mathematical communication skills. Questions from students during class provide opportunities to focus on mathematical vocabulary as we clarify concepts. An awareness of our own mathematical vocabulary as well as the mathematical vocabularies of students allows us to communicate with greater understanding.

Recognizing the importance of using a variety of teaching styles, some professors question the role of the lecture in mathematics classrooms. Nevertheless, the lecture remains a significant classroom technique, and it gives students practice in listening to mathematical communication. Lecturing can be effective, especially when it is used in conjunction with other teaching techniques. One advantage of lecturing is that it generally allows us to cover more material during a class period. However, successful lecturing requires as much effort as other methods. An effective lecture demands the same organization, preparation, sensitivity to students, and respect for the class. Students need to be actively engaged instead of passively present, so when lecturing, we want to engage them, perhaps by asking questions or by making eye contact with each student during the lecture. The key to a successful lecture is whether real communication takes place, and in turn, whether learning takes place.

Learning activities that incorporate reading, writing, talking and listening in the mathematics classroom can aid students in strengthening not only their mathematical communication skills, but also their understanding of mathematics. When students are asked to write or talk about mathematics, they are responsible for choosing appropriate vocabulary and for making the connections between related concepts. In this process, students internalize important concepts and retain them longer.

◆***Tests and other assessment instruments***

Tests serve several purposes and are one of the most important classroom activities. They provide helpful and useful information to students and faculty alike. First, they provide an assessment of student learning. They monitor and evaluate student progress in learning the course content. Tests also provide motivation as well as feedback to students. The questions we

ask on tests and the students' answers indicate what has been learned. However, by evaluating student learning, tests also evaluate our teaching. They determine what we have accomplished as instructors. Tests also provide a learning experience and should be considered as a vital part of the learning process. For students, tests and the reviews for tests are focal points for their study, and in this way tests support and enhance learning.

The careful construction and evaluation of tests are critical responsibilities for faculty. After we determine what we want students to accomplish in a course, we can focus class activities toward helping students attain the chosen goals. It's imperative that tests and final examinations accurately reflect the curriculum described in the course syllabus. Tests should reflect the content emphasized in class, and, in addition, they should reflect the methods of instruction. Students need to know what objectives are being measured on tests. Students deserve the assurance that the big ideas on tests have been emphasized, practiced, and probably repeated prior to the exam. We want tests to cover the main ideas of a course, not the obscure topics, and we want to balance the level of difficulty of the questions. Professors usually try to measure different hierarchical levels of understanding. It is helpful to consider the relative portions of each test that involve skills, concepts, and applications. We also want to write tests that are appropriate for the allotted time period. For timed tests, many professors verify that they can complete the test in full detail in about one-fourth or one-fifth of the allotted testing time, depending upon the material.

When developing a test, we first decide among various test formats, such as closed-book tests, open-book tests, take-home tests, group tests, timed and un-timed tests, essay tests, short-answer tests, open-ended questions, multiple-choice tests, and gateway tests with mandatory competency requirements. Gateway tests involve mastery level learning. In addition to the tests used to evaluate student learning in specific courses, students take a variety of placement tests, achievement tests, and diagnostic tests during their academic careers. The various types of tests serve different purposes and evaluate different kinds of learning.

An occasional open-note test encourages each student to determine the essential information from a particular unit and then to organize that material

into a helpful resource. Group tests allow students opportunities to share information and to appreciate a variety of insights and levels of comprehension. In group settings, students teach one another and are forced to communicate about the main ideas. This approach can lessen anxiety and aid concentration. In addition to measuring content knowledge on traditional tests, some professors design evaluation instruments to measure a student's ability to communicate mathematically, to read technical material, or to solve complex application problems. By learning more about various assessment options, we can make effective choices for our classrooms.

Alternative evaluation and assessment instruments include projects, journals, writing assignments, lab reports, oral presentations, student interviews, concept maps, and portfolios. Portfolios usually include a summary of a student's accomplishments in a course. When faculty use a variety of assessment tools, students have the opportunity to demonstrate their unique abilities and levels of understanding in various ways. By referring to the written objectives for each class, we can help students see how our various assessment methods fit together to indicate individual student progress toward those objectives.

Some professors choose to use test-related assignments or activities before and after tests to extend further the impact of the test on student learning. A review prior to a test helps students focus and prioritize topics to be covered. This review can provide structure and organization to the content. Later when a graded test is returned to students, we can increase the test's potential as a learning tool by asking each student to correct the errors on the test or to write an analysis of the test. In a test analysis students might be asked to indicate those topics with which they feel most comfortable as well as those that are confusing. We can ask students to describe the strengths or weaknesses of their test preparation. Such assignments often help students assume more responsibility for their test results.

There are standards that we apply to evaluating all types of student work. Prompt feedback is important for student learning. Students deserve and appreciate receiving their results as quickly as possible, and as they do, the feedback is more meaningful and the learning possibilities of the work are increased. Our students should understand the basis of our scoring plans.

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When graded work is returned to students, there always are learning opportunities as the relevant concepts are discussed and questions are answered. The prompt evaluation of tests, followed by our analysis of the test results, allows us to respond effectively in the classroom and to clarify topics that students have not yet mastered. When we evaluate student work carefully and conscientiously, any partial credit is granted consistently and our grading remains objective and fair to all our students.

◆***Additional classroom issues***

Many institutions have specific policies to deal with issues of academic dishonesty, such as cheating or plagiarism. Each professor needs to have a clearly stated policy to apply consistently in these cases. We need to be aware of institutional policies so that we can follow them and so that our own policies are in accord with the college policies.

There are rare occasions when a student's behavior might threaten to disrupt a classroom. A calm and firm method for handling such situations consistently and fairly is imperative. Discipline problems or inappropriate behavior should not be allowed to detract from the learning that is taking place in a classroom. We want to ensure that all students have the opportunity to learn in a supportive environment.

Faculty should be aware of legislation that is relevant to our profession. For example, we need to be familiar with laws dealing with copyrights and issues of privacy. Faculty should be informed about current laws regarding students with disabilities. We want to respect the rights of these students. It's important to be knowledgeable about the relevant accommodations to which these students are entitled and to understand our responsibilities in meeting their unique needs.

It is also important for faculty to be aware of sexual harassment issues because professors can be vulnerable to these charges. Exercising conscientious discretion and wisdom in all interactions with students can help preclude the slightest suggestion of harassment. In addition, we want to be alert to and help preclude any situation among students in our classroom where sexual harassment might become an issue.

Don Bigwood

Bismarck State College
North Dakota

I often am asked about the keys to success in the classroom. I respond that each class and each student need to be treated individually. In addition to a solid academic background, I think there are three major factors that determine success—patience, understanding, and flexibility. Many students have poor academic backgrounds, are in financial need, and/or are juggling two or three jobs plus dealing with children at home. Our job is to maximize the possibility of positive educational experiences for those for whom positive experiences have been few and far between.

Another important key to success is keeping current, and here AMAYTC has been critical for me. Early in my career I attended other regional and national meetings whenever possible. I heard stimulating speakers and learned a great deal, but often the problems that were addressed were not those I experienced in the community college setting. One year my department chairman suggested I attend AMATYC's national conference in Boston. I was excited to find speakers who were faced with the same problems, successes and failures that I had. AMATYC has been a valuable asset for low population states such as North Dakota by supplying financial support and expertise for our annual fall conference, thereby allowing our instructors access to some of the top educators in community college circles.

OPPORTUNTIES FOR EXCELLENCE BEYOND THE CLASSROOM

❖ Professionalism through independent enrichment

The mission of most two-year colleges includes the promotion of lifelong learning, and we practice lifelong learning by keeping ourselves informed about research, trends, and developments in mathematics education. Regardless of how much experience we've had, our receptivity to new ideas and our zest for learning demonstrate our commitment to professional development. There are many professional development opportunities that we can pursue independently, even without travel funds or colleagues.

Professionals in collegiate mathematics share a continuing interest in mathematics as well as a commitment to be knowledgeable about current developments in education. Although the specific educational topics receiving greatest attention vary from year to year, there is always much to learn. Pursuing the study of mathematics is a natural consequence of our ongoing enthusiasm for the discipline, and our own study helps us appreciate students' feelings as they wrestle with new mathematical concepts. It is also instructive to stay abreast of current news regarding community colleges and technical institutions. Developmental education, adult education, and teaching and learning styles are other fertile areas for study and research. We can investigate issues such as curriculum, assessment, articulation, or teacher preparation. Staying current also involves keeping up-to-date with technological developments and the educational uses of technology for effective and efficient communication, classroom management, and presentations.

Just as there are many topics for study, there are numerous sources for study. Reading scholarly literature about higher education in general and about mathematics education in particular is one approach. Traditional library resources remain a basis for study. Professional journals provide another source of current information. AMATYC's journal, *The AMATYC Review*, focuses on articles of special interest to two-year college mathematics faculty. This refereed journal is published twice a year. Other organizations dedicated to mathematics education also have journals and other publications. For example, the National Council of Teachers of Mathematics (NCTM) publishes *The Mathematics Teacher*, which is intended for

secondary school mathematics teachers, and the *Journal for Research in Mathematics Education*. The Mathematical Association of America (MAA) publishes journals including *The American Mathematical Monthly*, which focuses on pure mathematics, *Mathematics Magazine*, which presents undergraduate mathematical topics, and *The College Mathematics Journal*, which emphasizes the first two years of the college curriculum. There are also publications devoted to higher education in general, such as *The Chronicle of Higher Education*. Many other organizations and agencies, such as the Mathematical Sciences Education Board (MSEB), the National Research Council (NRC), and the National Science Foundation (NSF), frequently publish reports, survey results, or summaries of research projects. The *AMATYC News*, AMATYC's newsletter published five times a year, contains not only news about the activities of AMATYC and its affiliates, but also information regarding current national initiatives and reports of interest to mathematics educators.

Technology opens the door to other resources for research and enrichment. The number of web resources continues to grow exponentially, and their accessibility is a tremendous asset. These resources are especially valuable to faculty in remote locations and for those at institutions where travel funding is limited. Information regarding AMATYC, its activities, affiliates, and publications can be obtained from the AMATYC web site (www.amatyc.org). This site also contains links to other sites of interest to mathematics educators. Through technology we can participate in Internet discussion groups focusing on recent developments and current issues in mathematics education. MATHEDCC, AMATYC's Internet discussion group, centers on topics relevant to two-year college mathematics education. Teleconferences, telecourses, and various distance-learning opportunities are additional options for technology-based professional development without the need for travel funds.

Conducting classroom research projects can also be professionally enriching and educational. There are simple and direct means of conducting research. We frequently compare results from one semester to another to see whether a change in instruction is having an impact on students. We devote time to reflective analysis of the relationship between teaching strategies and student

success. Classroom research might involve an assessment of test results. It could include formal or informal test item analysis to find strengths and weaknesses in our teaching. There is an abundance of available topics to investigate, and our two-year college classes can be the setting for relevant and meaningful research.

Other opportunities for independent professional development can be found through involvement in creative educational activities. Taking time to write a journal article about a mathematical or pedagogical topic is one avenue for professional growth and sharing. Professional journals also need reviewers to provide constructive criticism as manuscripts are submitted for publication. We can let journal editors know of our interest in this activity. In addition, most textbook publishers have an ongoing need for professors who will review textbook manuscripts. We also can pursue a wealth of other creative opportunities, such as authoring textbooks or textbook supplements, creating online materials, or contributing to software and technology development. Initiatives such as these are always learning opportunities.

Recognizing the importance of professional development and personal enrichment, faculty find ways to make time for these valuable experiences. Some professors take formal coursework during the summer. Others arrange their teaching schedules to allow time for taking courses during the academic year. Sabbatical opportunities at some institutions provide time for special projects. A sabbatical leave might be used to pursue an advanced degree, to design and carry out a research project, to write, to work with a community business or agency, or to investigate a special interest.[4] A sabbatical can be a most rewarding experience, but sabbatical possibilities are non-existent at many colleges. Some professors find it helpful to establish their own mini-sabbaticals. They make a commitment to set aside an hour or more on a regular basis for a time of self-renewal and professional development.

[4] The AMATYC website (www.amatyc.org) contains information about becoming an AMATYC Consulting Professor during a sabbatical leave devoted to an AMATYC project.

When we independently explore professional development opportunities, we nurture our own desire to learn and our excitement in the learning process. Our students sense this commitment. We want to continue investigating mathematics, pedagogy, and learning styles. It's important to take time to reflect upon our teaching in the light of new trends and developments in mathematics education. Thoughtfully setting personal and professional priorities and then regularly reflecting upon these priorities is a vital aspect of continuing professional enrichment.

Agnes Azzolino

Middlesex County College
New Jersey

For me, activities, responsibilities and opportunities, ongoing development and professionalism are so intertwined that they ***are*** *two-year college mathematics education. I can complete my responsibilities—teaching, supporting student development, and writing a semi-internet liberal arts course for education majors—and take advantage of opportunities—attending professional meetings and commercial seminars—because the members of my professional support group—family, my Teaching Excellence Award nominator at another institution, my former students, and my department chair—are there to lean upon, to inspire, to reinforce, to refocus. My profession with its publications, meetings, and emails—including emails to and from students and colleagues plus professional newsletters—is an extensive presence in my life.*

It's a rich and wonderful life, but it is often demanding. It is a world filled with those family members, colleagues, and students who also have chosen to take the path less traveled or never before traveled. It is a world filled those who also juggle roles and worlds to achieve or complete a dream.

❖ Professionalism within the department

Wherever a mathematics department includes more than one person, the colleagues within the department are likely to engage in lively discussions about mathematics education. Working together on teaching schedules, curriculum changes, textbook selections, or course development provides opportunities to build valuable collegiality and to contribute to the synergy within the department.

As professionals explore new concepts, we inevitably want to share new ideas with colleagues. When we experiment with new techniques, it is helpful to share results of unsuccessful ideas as well as successful ones. Collaborating with colleagues, seeking and providing feedback to one another, discussing, analyzing, and critiquing ideas, whether formally or informally, are wonderful forms of professional development. Teaching doesn't need to be a solitary experience. By communicating with colleagues and asking for help or opinions, we reap the benefit of another professional's perspective, experience, and insight. Departmental discussions of issues related to teaching and learning can be most beneficial. There is a need within each department for a significant number of faculty who are willing to try new teaching strategies, and departments can do much to encourage academic support for innovations and for scholarly efforts in the classroom.

It is vital for each of us to contribute toward the development of a shared vision for mathematics education at our own institution. A collective awareness of the desire to build a supportive climate for student learning throughout the department is most advantageous. It is helpful to consider the team nature of a department. When each faculty member recognizes the importance of being a constructive part of that team, departmental interaction is collegial and professional. As each professor does a better job, the results for the department as a whole are greatly improved.

Program assessment and evaluation give departments opportunities to re-examine their goals and the progress that has been made toward those goals. Every department wants to retain what is effective and find ways to improve. It is the shared professional responsibility of the faculty within a department to be accountable for what students learn. This responsibility necessitates measuring learning by topic and using the results to design

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necessary program improvements. Increased student learning is the underlying goal of departmental improvements to curriculum design or quality of instruction.

As members of an academic department, we have a professional obligation to devote attention to the issues confronting the department and to contribute toward the success of departmental initiatives. Receptivity to change is a valuable asset. Not only are there changes in curriculum, textbooks, and schedules, but even classrooms are changing. Today we can expect variety in the delivery modes of our courses. In addition to the traditional classrooms, distance education brings us asynchronous courses and virtual classrooms. We have web-based instruction and mediated learning. Because change is as necessary in academic institutions as in other institutions, we each owe our department the thoughtful consideration of proposed changes and new approaches.

One of the most critical functions of every department is the development of curriculum, and nowhere is departmental collaboration and discussion more valuable than in this work. Curriculum development should include a study and determination of what content topics are essential and of how those essentials are related. Thorough curriculum development often involves discussions about methods for presenting topics and ways to apply concepts in problem-solving activities.

Experienced full-time faculty within a department share the responsibility to reach out to new full-time faculty as well as to adjunct faculty. When new faculty join our department, there is much we can do to make them feel welcome. Formal and informal mentoring of new faculty is beneficial to the entire department. Including newcomers in informal conversations and activities can be as helpful as their inclusion in regular departmental functions. We can share with them our vision for our department, our expertise, and our passion for teaching. We can also learn much from the influx of innovative ideas and fresh perspectives that new educators bring to a department. Furthermore, we strengthen the adjunct faculty's contributions, both in and out of the classroom, by advocating their integration into departmental discussions, decisions, and professional development activities as much as possible.

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More formal methods of professional development are also possible within a department. Some colleges have well-defined peer evaluation programs for faculty, and these programs can provide a focus for ongoing discussions of professional growth. A series of colloquia on topics from mathematics or mathematics education can be extremely helpful. Presentations and departmental discussions about recently published educational studies or relevant research results keep us attuned to new developments. Bringing speakers to campus can be a cost-effective way to open such opportunities to adjunct as well as full-time faculty. AMATYC offers a variety of workshops that can be hosted on our campuses. Speakers address topics of current interest in mathematics education, and they tailor their presentations to meet the requests and needs of the department.

A mathematics resource center or a mathematics laboratory can serve students' needs while providing opportunities for professional development for faculty. Appropriate technology needs to be available in these centers. A mathematics laboratory can be used as a setting for class instruction, and it can provide open lab opportunities for both faculty and students. The availability of tutoring services for mathematics students from peers or professionals is an essential component of these facilities. By providing settings that allow students to work together in groups, such learning centers promote student interaction as well as faculty-student interaction. Some resource centers include space for faculty to work together on departmental projects.

Many mathematics departments provide enrichment opportunities for mathematics students. Organizing and coordinating these activities can be professionally stimulating and rewarding. Because enrichment activities frequently attract strong students, our involvement in these projects allows us to work closely with highly motivated and talented students. A math club or a mathematics and science fair can provide students with opportunities to pursue topics of interest outside the normal curriculum. Some colleges provide honors programs in mathematics. Students from many two-year colleges take part in the National Student Mathematics League, an annual competition sponsored by AMATYC for two-year college mathematics students. All of these activities require the leadership and the cooperative efforts of dedicated professionals within the department.

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David Dudley

Phoenix College–Maricopa Community College District
Arizona

I am occasionally asked about how I teach. I usually tell whoever asks that I take what I have learned from others and try to adapt it. I have two sources of ideas: going to professional meetings and going to lunch with the members of my department. In other words, I try to steal from the best.

One of my favorite classes to teach is Beginning Algebra. In this course, I feel I can make the biggest difference in a student's attitude about mathematics. I try to convey how much fun mathematics can be at all levels—including the entry level.

At my college, the calculus instructors usually get "promoted" along with their classes. Watching students develop camaraderie over several semesters along with their calculus skills is one of the most rewarding aspects of teaching at a two-year college.

The most meaningful part of my involvement with AMATYC has been the friendships I have enjoyed from attending the national and affiliate meetings.

❖ Professionalism across campus

Just as we value the professional relationships with those in our own departments, the importance of campus-wide collegiality and academic respect across departments cannot be overstated. Healthy, constructive professional relationships with colleagues in other departments are very beneficial.

Our professional responsibilities include helping to resolve issues affecting the college as a whole. As we become involved in learning communities, serve on college-wide committees, and participate in various student support services, we establish rapport with those from other disciplines. Helping to create and teach interdisciplinary courses is an excellent way to forge strong ties with other faculty. We often can encourage those in related fields, such as the natural sciences, economics, or the social sciences, to reinforce students' mathematical abilities. In addition, we can solicit appropriate mathematics application problems from colleagues in other departments. Integrating student learning across disciplines enhances students' appreciation of the usefulness of mathematics. Regular communication and interaction with colleagues from other disciplines widens our views of student needs and student learning. Building networks with professors across campus can be invaluable when campus-wide initiatives are taking place.

It is advantageous for faculty to be aware of the campus resources that are available for use by faculty and students. The college library, as well as various resource facilities and laboratories, provide access to books and other materials that are helpful to the study of mathematics. Each institution has procedures for new acquisitions for these facilities. We can provide valuable input to our institutions by reviewing the current holdings relevant to our discipline and making suggestions for new resources to strengthen the collections.

Often professional development opportunities are available on a campus-wide basis. We can encourage funding for new enrichment activities that are beneficial to a broad segment of the faculty, and we can advocate appropriate institutional support in the form of funding, resources, or personnel for campus-wide professional development needs.

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We can work with others within our institution to strengthen applications for grant support to scholarly projects. Professors can learn a great deal through the process of writing grant applications. Frequently local foundations or local industries make funding available for specific projects through grants. Other organizations and agencies do so on a regional or national level. Although the process can be highly competitive, grants are an excellent source of funding for worthwhile educational activities.

❖ Professionalism in the community

Most professionals in higher education share a commitment to civic involvement and community betterment. As mathematics faculty at two-year colleges, we have abundant opportunities to exercise professionalism within our communities.

There is much that we can do to strengthen mathematics education within our local school districts. We want strong articulation agreements between our two-year colleges and our local secondary schools, but we also want to develop professional relationships with their teachers and staff. We help establish these connections by giving talks to students or parents and by participating in pre-service and in-service programs for teachers.

It's also valuable to form partnerships with business and industry in our communities. Dialogues with representatives from these groups can help determine their workplace needs and analyze what we are doing to meet those needs. These groups are a potential source of funding for special projects within the department or throughout the institution. In addition, representatives of business and industry often set up support programs for students. Sometimes outside grant money is available to cover release time for faculty who help local industries. Many boards of directors appreciate the mathematical expertise that we can offer. When we are willing to provide consulting services or other types of assistance to community organizations and agencies, we establish valuable community contacts and generate good will.

Beyond these more formal contacts within the community, there is much that we can do informally to build community support for mathematics and mathematics education. In local newspapers and community meetings, we

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can articulate the importance of mathematics education and the issues facing mathematics education today. We can be advocates of high-quality mathematics education in our local schools. Two-year college faculty are well prepared to respond to the need for community leadership in improving mathematics education. Most parents care deeply about the education of their children, and there are questions in every community that deserve to be addressed by professionals. We need to take part in these discussions. We can encourage our fellow-citizens to support rigorous mathematics programs in the local school districts. We can encourage parents to be supportive when their children bring home mathematics assignments, and we can urge parents to see that their children enroll in as many mathematics courses as possible in the secondary schools.

We also share a professional responsibility to try to change society's too-prevalent belief that it's acceptable to be unable to do mathematics. Our two-year colleges are based on the principles of equity, access, and excellence. As we advocate excellent instruction for all students, we continue to challenge the notion that many people are incapable of learning mathematics. Unfortunately, the inability to do mathematics is accepted in our society; it doesn't carry the stigma of illiteracy. Everyone expects today's citizens to be verbally literate, and it is vital for our population to possess quantitative literacy as well. As mathematics educators, we look for opportunities to help diffuse the math anxieties of the general public and to point out the importance and relevance of mathematical literacy.

Many people are aware of the historical role of mathematics, but they remain unaware of its contemporary role in society. We want people to appreciate the importance of mathematics in their careers and in their lives. Those of us who teach this subject know of its practical applications, so we can be spokespersons for heightening mathematical awareness in our communities. We can introduce others to the commercial impact of mathematics in diverse areas such as resource allocation, manufacturing and design, health care, the environment, agriculture, cryptography, or financial forecasting.

Some educators develop mathematics appreciation courses through the continuing education program at their colleges. There are opportunities to participate in local speakers bureaus and make presentations to community

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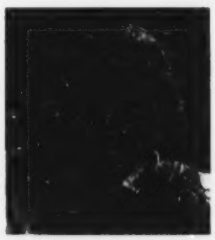
service organizations. It's beneficial to let our views be known to policymakers. We want to help our communities replace misunderstanding and confusion about mathematics education with positive views regarding the value of mathematics and mathematics education. Formally and informally, whether we're talking with policymakers or with neighbors, we want to encourage others in our communities to appreciate the usefulness and the beauty of mathematics.



Sharon Cutler Ross

Georgia Perimeter College
Georgia

Active participation in professional organizations such as AMATYC marks the difference between having a job and having a career. In the United States teachers do not control their certification and licensure, as do physicians, engineers, and other professionals. Thus, having an organization like AMATYC represent us as professionals is especially important. AMATYC's position as the only professional organization dedicated solely to the first two years of college mathematics is something we should all appreciate and value.

My involvement with AMATYC, both at the regional and national level, has been an important part of my career. The challenges of budgeting time and energy for my AMATYC activities are well rewarded by the opportunity to develop bonds with colleagues throughout North America, the opportunity to enhance my classroom skills, and the opportunity to aid others in their professional development.

❖Professionalism in the mathematics education community

Involvement in professional organizations devoted to mathematics and education is an enriching avenue toward professional development. Such organizations promote interaction among colleagues and help us stay abreast of current developments, both in mathematics and in education. Through these professional organizations we continue to enhance our teaching expertise as well as our mathematical expertise.

Active involvement with AMATYC should be a major component of a two-year college professor's professional life. We all appreciate the value of professional development, and AMATYC is certainly a place to find it. Within this organization, we find a wide variety of opportunities for learning and for direct involvement in mathematics education on a regional and national level. Becoming a member of a professional organization such as AMATYC is a first step, but active participation greatly increases our learning opportunities. Joining an AMATYC committee or volunteering to be part of a task force allows us to make valuable contributions to the organization and to become more informed about issues relevant to our profession.

AMATYC represents the interests of two-year college mathematics faculty in national and international dialogues about mathematics and mathematics education. The organization's visibility in Washington, D.C. ensures that AMATYC members will be informed about opportunities, issues, and initiatives of wide interest and import. AMATYC's Washington presence also helps to guarantee that the voice of two-year college mathematicians will be heard during crucial policy deliberations and that funding from agencies such as the National Science Foundation is available for two-year college projects.

Each year AMATYC holds a national conference that brings together two-year college mathematics faculty to focus on national initiatives and to share ideas about successful classroom strategies and activities. The extensive exhibits at the conference introduce new textbooks and other educational materials. One of the most rewarding benefits of attending the conference is the informal exchanging of ideas with colleagues. There are always

opportunities for discussing topics in mathematics, curriculum matters, teaching strategies, pedagogical issues, and an array of other mutual concerns. This lively sharing inevitably takes place everywhere at the conference—at presentations, during breaks, over meals, or on outings away from the conference itself. Such interaction offsets the isolation felt by faculty who have few occasions for contact with colleagues in mathematics education. AMATYC also sponsors workshops, institutes, and regional conferences at various locations in the US and Canada. All of these opportunities for networking with one's colleagues can provide invigorating professional renewal.

AMATYC has affiliate organizations in most states and regions of the United States, as well as in Canada. These affiliate organizations provide a regional emphasis and more opportunities for sharing with colleagues. Involvement in professional organizations at a local or regional level provides a setting for ongoing interaction with colleagues at nearby institutions. Accepting a role in the work of the organization or volunteering to present a talk at a meeting are excellent ways to learn more about these local groups.

Even though AMATYC is not the only professional organization dedicated to mathematics education, it is the one organization that focuses exclusively on two-year college mathematics. Other organizations that also offer professional development opportunities include the American Association of Community Colleges, the American Mathematical Society, the American Statistical Association, the Mathematical Association of America, the National Association of Developmental Education, the National Council of Teachers of Mathematics, and the Society for Industrial and Applied Mathematics.

Our professional relationships and responsibilities within the larger mathematics education community include our ties and articulation agreements with the four-year institutions in our area as well as with the K-12 school districts. Developing these valuable relationships widens our appreciation of a student's entire mathematics curriculum and allows us to make this curriculum as seamless as possible. We are better prepared to help students when we are aware of the high school graduation requirements in

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mathematics, the mathematics requirements for transfer to four-year institutions, and the testing required at various levels of a student's mathematical education. It is imperative that we make efforts to assure students of a smooth transition to upper division mathematics courses at nearby four-year colleges. Strong lines of communication and ongoing dialogues between two-year and four-year institutions are vital and go a long way toward facilitating a student's transfer to the baccalaureate institution.

Special attention is warranted for working with four-year institutions on issues related to teacher preparation so that these teacher preparation efforts are coordinated and core courses are appropriately aligned. Ongoing communication and partnerships between two-year colleges and four-year institutions can lead to the creation of strong, cohesive teacher education programs. Community colleges are a potentially rich source of prospective students for these programs. As we actively encourage students to consider careers in teaching, our recruiting efforts can help our communities meet the need for teachers at the local level.

Jean Lane

Union County College
New Jersey

I attended my first AMATYC conference in 1976 in San Francisco, my second year of teaching. It was wonderful for me as a new teacher to learn that others all over the country were having the same problems and triumphs that I was. AMATYC has allowed me to continue to share experiences and meet many great people.

A few years ago, a young man who had just failed my precalculus class became quite angry with me. He had done nothing in the course, but he wanted a passing grade because his father would be mad at him. I, of course, refused. I really thought he might hit me; one female student, about half his height, told me afterwards she was ready to hit him with her book to defend me! Four years later, the same young man signed up for my course again. At the end of the first meeting, he came up to talk to me, asked if I remembered him, and told me I had done him the biggest favor of his life by not giving him a passing grade. He flunked out of school, worked at a low pay, heavy labor job for a year, and realized how important a good education really is. Two years later, I took his picture at graduation!

The key to my success in the classroom is a genuine concern for my students' success in the classroom. A sense of humor helps, too! I was recently asked if I was happy. Yes, and I consider myself very successful. I have the respect of most of my colleagues, the love and respect of my students, and I make a good living at a job I love.

PROFESSIONALISM AND ITS REWARDS

❖ Contributions to student success

The most obvious contribution that mathematics faculty make to student success is in helping students learn mathematics. However, there is much more that we can do in the classroom.

Learning how to learn is one of the most valuable lessons for students to master. How wonderful it would be if we could package this ability and distribute it freely as a gift to students. However, we all can help students make progress toward the goal of learning how to learn. Learning requires commitment, self-sacrifice, and hard work, and we want students to know that the value of an education makes the effort worthwhile. As we encourage students to be patient in pursuing a topic until they can grasp it, to persevere instead of giving up when facing difficult problems, and to put forth the necessary effort to be successful, we help them develop good work habits. As students appreciate their role in learning, they build an awareness of their ability to learn. We can provide students with opportunities for self-evaluation and reflection about their progress in becoming independent learners—in developing the willingness and the ability to tackle academic challenges with patience and persistence. As students accept responsibility for the quality of their education, they move away from the limitations of learned helplessness or a victim mentality into an awareness of their potential. Their motivation comes from within themselves. Knowing they have the ability to learn, they make appropriate decisions that support their academic pursuits.

Teaching is a privilege. Choosing to pursue a career in mathematics education at a two-year college allows us to witness many student success stories. We are in one of the most exhilarating places to be in education today. Experiences in the mathematics classroom touch students in ways that impact them forever. We can experience the excitement of sharing a mathematical idea with some who understand it for the first time. We can help at-risk students succeed in college mathematics courses. Each time we help instill more self-confidence in students, they discover more of their mathematical abilities and see themselves as capable of learning and using

mathematics. These feelings can remove the barriers of doubt and anxiety that many students have carried for years towards mathematics. We all want to be counted among those professors who cared enough to help enrich someone's life. It is a joy to be able to help unlock potential and open doors for students, empowering them to pursue enhanced career opportunities and more fulfilling options in their lives.

❖ Contributions to community progress

Our chosen career also allows us to be agents of change in our communities. Two-year college students reflect the rich diversity of society. This society needs citizens with an increasingly sophisticated level of mathematical understanding. Success in a technology-driven global economy requires an understanding of numeracy. When we help students develop good mathematical study habits and academically healthy attitudes toward mathematics, students possess the key components of long-term success in our discipline. As we encourage students to study more mathematics, we are making contributions towards increased mathematical awareness among our citizenry. We are making contributions toward a mathematically literate population. Helping educate our fellow-citizens to exercise leadership and to make wise choices based on their knowledge of mathematics is a lasting contribution to our communities.

APPENDIX

❖ Personal reflections

Teaching has been compared to planting and tending a garden. No gardener plants without holding a vision for the future. There is always an expectation of the rich harvest and the beauty to be realized by the end of the growing season. By mid-season, frustration and fatigue emerge sometimes when the weeding is tedious, the hoeing becomes strenuous, the ground seems too wet or too dry, and the new growth appears sparse. Yet, the hopes remain for what the garden might become. As the plants reach maturity, a few fail to develop as the gardener had hoped. Nevertheless, the peak of the season brings delightful surprises. An unpretentious corner of the garden fills harvest baskets to overflowing and small buds blossom into unexpected beauty surpassing expectations. Even when a previous year's garden wasn't all that it might have been, the avid gardener returns to every new planting season revitalized with fresh ideas and renewed hope. There's an eager willingness to blend familiar techniques with new ideas recommended by fellow gardeners. And, most importantly, there's an underlying and unspoken optimism that perhaps this next garden just might be the very best one yet. These visions, dedicated efforts, uncertainties, rewards, and optimism characterize our teaching careers at two-year colleges.

Helping capable mathematics students emerge from cocoons of self-doubt is highly rewarding. As we look back upon previous semesters of teaching, we remember students rather than topics; we remember individuals and their stories of accomplishment. We remember the timid, math-anxious enrollee in a developmental course who, over the course of several semesters, evolved into a confident and capable calculus student choosing excitedly to pursue a career in mathematics education. We remember countless significant stories of students who thought they could never do mathematics but found within themselves the determination that enabled them to succeed. We remember exceptionally strong students whose understanding and talents helped them find mathematical insights surpassing our expectations as well as their own. We also remember wonderfully resilient students who tried and failed, but who were willing to try again with increased dedication and perseverance until they were successful.

67 BEST COPY AVAILABLE

Appendix

Teaching is hard work. It can be demanding and sometimes exhausting, but teaching can also be an exciting and stimulating career. How wonderful it is to see in a student's eyes the confidence that comes from meeting and conquering a challenge and being prepared to climb higher. It is a privilege to be able to work with a diverse student population and to watch them break down barriers of age, background, and culture as they learn together. We two-year college educators frequently have the opportunity to provide guidance to someone desperately needing direction, to listen to someone who feels that no one cares, to offer new hope to someone who has very little of this valuable commodity. Seeing the unique potential that each student brings to the classroom, we can help students appreciate and build upon their own individual strengths and abilities. There is truly a grand purpose here: making a difference in people's lives. This gives real meaning to our work.

I believe that some of the most effective, innovative, and exciting teaching that is taking place today is found in our two-year colleges. Where else do eighteen-year-old high-school graduates, retirees, middle-aged people changing careers, immigrants starting new lives, and single parents wanting better opportunities for themselves and their children come together to learn side-by-side...about mathematics and perhaps about life. The two-year colleges provide a dynamic teaching and learning environment with the potential to empower millions of our fellow-citizens who otherwise might not have access to educational opportunities.

I feel fortunate to be teaching at an institution where dedication and excellent instruction are the rule rather than the exception, and I have great respect for the work of those Johnson County Community College colleagues who teach with me. I thoroughly enjoy my chosen career. In fact, I've loved this profession ever since the summer of 1977 when I taught my first community college course—with only two days' advance notice. I'm grateful that the college took a chance on a new, inexperienced adjunct mathematics instructor that summer. That was the beginning of a grand adventure that continues today. The intervening years have been most rewarding for me.

I truly enjoy the time I spend in the classroom—and I hope my students do, too! The real highlights of an educator's career take place in the classroom on a day-to-day basis, quietly and without ceremony. Warm greetings are

exchanged, a laugh is shared, rapport builds, new ideas are introduced, described, investigated, discussed, examined, analyzed, explained, re-explained...and then slowly a few heads nod in agreement, eyes brighten with understanding, and smiles indicate the new concepts seem manageable. Learning takes place! It is there in the classroom that we reach our students—not only by what we say and do, but especially by what we are.

As educators we touch lives in more ways than we realize. If we can empower our students, if we can aid them in becoming self-reliant, lifelong learners, if we can help them develop the capacity to overcome whatever obstacles separate them from their goals, we can indeed be catalysts for progress—in individuals and, therefore, in our communities. This is the essence of teaching.

❖ About the author

Carolyn F. Neptune is a professor of mathematics at Johnson County Community College in Overland Park, Kansas. She began her teaching career at JCCC in 1977 as an adjunct instructor, and she has been a full-time faculty member since 1982.

From 1995 until 1999, Professor Neptune served two terms on the Executive Board of AMATYC as Central Region Vice-President. She was a founding member of KAMATYC, the Kansas affiliate organization of AMATYC, and has served on their Executive Board since 1988. Neptune was named as the first AMATYC Consulting Professor when she was awarded a sabbatical leave from JCCC to write this publication.

In 1994, the Association of Community College Trustees presented Neptune with the William H. Meardy Award as the outstanding community college professor in the country. In that same year she was named the Kansas Professor of the Year by the Carnegie Foundation for the Advancement of Teaching. JCCC has recognized Neptune with five Distinguished Service awards, two Burlington Northern Faculty Achievement Awards, and four Extra Efforts Awards.

With Ron Larson, Neptune wrote *Intermediate Algebra: Graphs and Functions* and *Essentials of Intermediate Algebra: Graphs and Functions*, published by Houghton-Mifflin. She is also an author of *Online Math* with Ron Larson and David C. Favro, and she has written eight supplementary mathematics texts. Neptune served as a Phi Theta Kappa advisor at JCCC for thirteen years and was recognized by that organization with the Robert Giles Distinguished Advisor Award in 1999. She has made numerous presentations at local and national mathematics education conferences.

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